



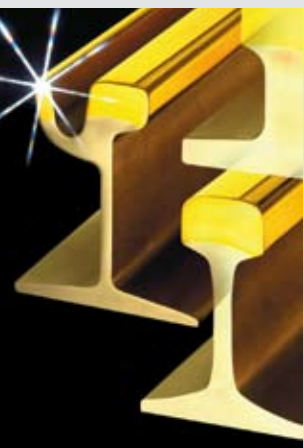
RF system

Cost savings and increased performance for public urban traffic
voestalpine Schienen – VAE – voestalpine Klöckner Bahntechnik





Public urban rail transport - at the pulse beat of the cities



Global urbanization and the pushing back of downtown automobile traffic require increasingly efficient and available public transport systems. The highest wear resistance is particularly required from rails in order to cope with the increasing demands successfully and economically (such as extremely small curve radii, "minute intervals", very limited maintenance times, etc.) voestalpine Schienen as the leading European manufacturer of railway, grooved and turnout construction rails offers, with its family of heat treated rail steel grades, produced in the most modern production facility worldwide, an unmatched customer benefit package, as sustainable problem solution.

Head-hardened HSH® rails certainly provide the most economical solution for commuter train and underground railway curves with a radius of less than 500 m owing to their average three-fold wear resistance.

For tramway tracks, too, a maximum of wear resistance has topmost priority, and it can be attained with the deployment of head-hardened grooved rails. This contributes significantly to a lengthening of the life span, while concurrently lowering maintenance costs in urban traffic, which are causing an ever weightier burden for public transportation operators.

A class by itself: head-hardened grooved rails with 2 winning options
voestalpine is the only company in the world manufacturing head-hardened grooved rails –

owing to the asymmetrical rail geometry, this is no easy task, not just in the rolling process but particularly for the heat treatment. Owing to our advanced technology, we've been able to master these requirements without having to make any compromises. We even offer two versions of heat-treated grooved rails: the steel grades HSH®-M and HSH® are available, which differ from each other mainly by their suitability for welding re-profiling (the so-called "buildup" by welding).

Option 1: grooved rails of the steel grade HSH®-M can – in the same manner as grooved rails of the 700 and/or R200 grade – be re-profiled without preheating in an installed state – an option desired by many urban traffic operators.

Option 2: For manufacturing HSH® grooved rails, the same chemical composition like that of vignole rails is utilized. That is the reason why the wear resistance is about eight to ten times higher than that of a rail of steel grade 700 or R200. For the identical reason, welding re-profiling without preheating cannot be carried out for this grade; but it's for a very good reason that this deployment strategy is frequently called "put in and forget," owing to its long life span.

In general, for curves with a radius of less than 300 m, also for grooved rails, the deployment of head-hardened steel grades is recommended.

www.voestalpine.com/schienen

Our Product Range in the area of grooved rail turnout systems includes:

- ◆ Single turnouts
- ◆ Similar and contraflexure turnouts
- ◆ Equal split turnouts
- ◆ Interlanced switch devices
- ◆ Diamond crossings
- ◆ Single and double slips
- ◆ Expansion joints
- ◆ Ramp crossing turnouts
- ◆ Track panels
- ◆ Twin tracks
- ◆ Double track junctions
- ◆ Fixed half switches
- ◆ Complex layouts
- ◆ Switch machines

Innovative turnout technology for urban transport



VAE GmbH



VAE is the world market leader in turnout technology for railways, metros and tramways. The development of innovative solutions on the highest technical level and the reduction of Life Cycle Costs (LCC) constitutes the focus of our company philosophy. VAE is system provider within the switch area and in system-inherent electronic monitoring, securing and hydraulic drive units.

The VAE group designs and manufactures complete layouts, vignole as well as grooved rail turnouts and turnout components such as crossings and switch devices in all available rail profiles and required gauges according to international standards or specific customer requirements.

VAE has vast experiences in the design and manufacture of grooved rail turnouts as well as switch machines complying to international

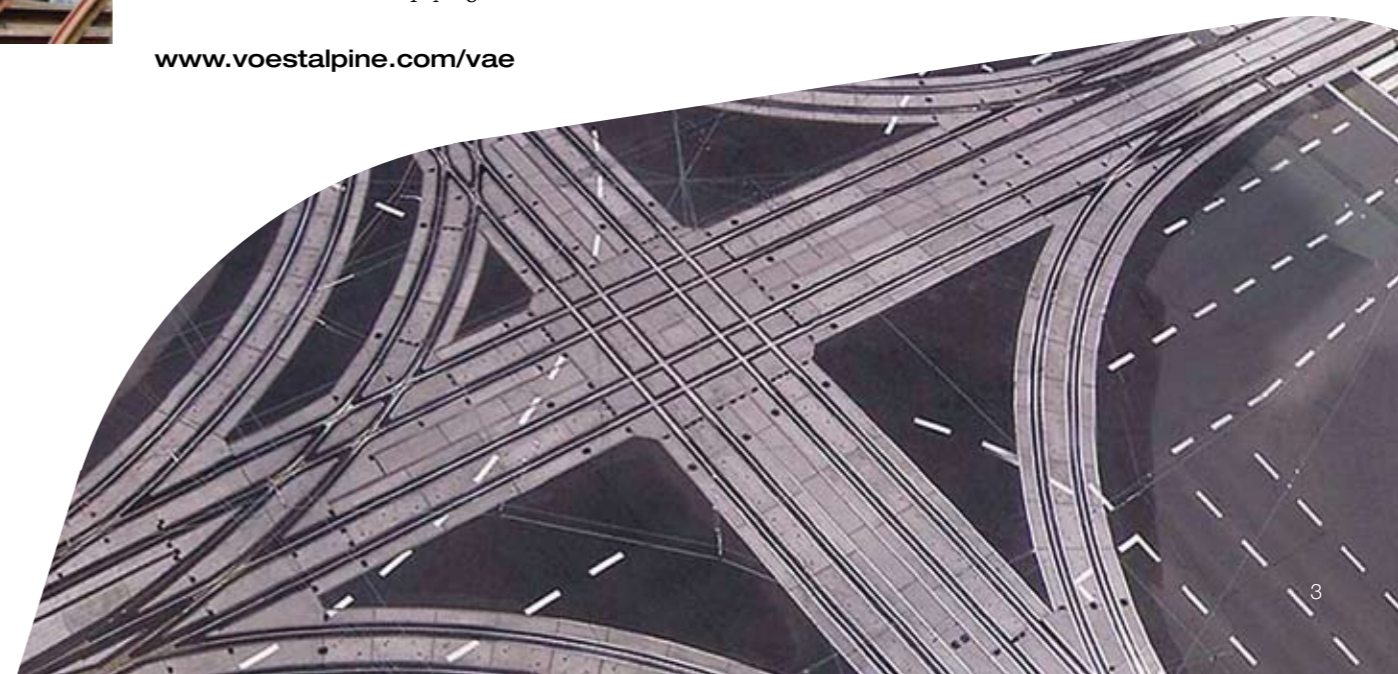
www.voestalpine.com/vae

standards or specific customer requirements. An important factor to decrease LCC of a tramway turnout is the initial quality at the stage of installation. There exists a close relationship between initial quality, life time and maintenance intervals.

Measures to minimize LCC and to increase initial quality are:

- ◆ Use of high strength material grades
- ◆ Switch machines with reduced maintenance requirements
- ◆ Preassembling and just-in-time supply for efficient installation

For every application there is an optimum, composed from modular system elements.





System supplier for Track Projects and Urban Railways



RF system

voestalpine Klöckner
Bahntechnik GmbH



voestalpine Klöckner Bahntechnik GmbH is a well-known company with a long history and vast knowledge of developments in the market.

The wholly-owned subsidiary of voestalpine Bahnsysteme GmbH & Co KG, headquartered in Berlin and with further branch offices in Duisburg, Frankfurt, Osnabrück and Munich, offers products and services for track technology.

voestalpine Klöckner Bahntechnik counts virtually all of Germany's urban railway companies among its customers. This is associated with a very wide range of experience and proficiency. The basic work principle is system thinking. Nowadays life-cycle considerations carry increasing weight where investments in railway technology are concerned. Any idea that increases the lifespan of the track is thus an innovation for the success of rail and urban traffic.

One of our key innovations for track constructions is the "RF" system, an elastic grooved rail design with high-quality structureborne sound isolation for municipal transport.

RF system advantages:

- Conventional and simple installation, including track alignment and gradients

- Rail replacement without destroying the entire system
- Minimizes rail traffic interruptions
- No tie rods
- Long service life and reduced maintenance
- Cost savings when compared to similar systems
- Adjustable for all gauges
- Various types available: for concrete sleepers, flat steel sleepers, track carrying plates

The range of products and services includes grooved rails, vignole rails, switch rails, turnouts, mountings, sleepers, other permanent-way material, competence with semi-finished products, state of the art production processes, rail logistics (just-in-time), quality assurance and research & development.

voestalpine Klöckner Bahntechnik GmbH, as a problem-solving partner for track projects and urban railways, implements all the advantages of a full-service supplier with general contractor expertise for the entire track system. Thus, for voestalpine Klöckner Bahntechnik, track competence also means to incorporate maximum intellectual flexibility into the partnership with its customers.

www.voestalpine.com/kloecknerbahntechnik

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